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SOME ESTIMATES FOR MEROMORPHIC FUNCTIONS SHARING FOUR VALUES

Dedicated to Professor Nobuyuki Suita on the occasion of his 60th birthday

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1. Introduction

In this paper the term "meromorphic function" will mean a meromorphic function in $\boldsymbol{C}$. We will use the standard notations of Nevanlinna theory: $T(r, f)$, $m(r, c, f)$, $N(r, c, f)$, $\overline{N}(r, c, f)$, $N_k(r, c, f)$, $\overline{N}_k(r, c, f)$ ($c\in\boldsymbol{C}\cup\{\infty\}$, $k=1, 2, \cdots$), and we assume that the reader is familiar with the basic results in Nevanlinna theory as found in [3]. Further, we will use the notations and terminology defined in the following (i)-(vi):

(i) Let f and g be distinct nonconstant meromorphic functions. For $r>0$, put $T(r)=\max\{T(r, f), T(r, g)\}$. We write $\sigma(r)=S(r)$ for every function $\sigma:(0, \infty)\to(-\infty, \infty)$ satisfying $\sigma(r)/T(r)\to 0$ for $r\to\infty$ possibly outside a set of finite Lebesgue measure.

(ii) For two nonconstant meromorphic functions f, g and $c\in\boldsymbol{C}\cup\{\infty\}$ we denote by $\bar{n}(r, c)=\bar{n}(r, c; f, g)$ (resp. $\bar{n}_1(r, c)=\bar{n}_1(r, c; f, g)$, $\bar{n}_3(r, c)=\bar{n}_3(r, c; f, g)$) the number of distinct roots of at least one of the equations $f=c$ and $g=c$ in $|z|\leqq r$ (resp. the number of distinct common roots of $f=c$ and $g=c$ with the same multiplicities in $|z|\leqq r$, the number of distinct c-points of f or g which are not common to f and g in $|z|\leqq r$). We write

$$\overline{N}(r, c)=\overline{N}(r, c; f, g)=\int_0^r \{\bar{n}(t, c)-\bar{n}(0, c)\}/t\, dt+\bar{n}(0, c)\log r,$$

$$\overline{N}_j(r, c)=\overline{N}_j(r, c; f, g)=\int_0^r \{\bar{n}_j(t, c)-\bar{n}_j(0, c)\}/t\, dt+\bar{n}_j(0, c)\log r \quad (j=1, 3)$$

and

$$\overline{N}_2(r, c)=\overline{N}(r, c)-\overline{N}_1(r, c).$$

Further, for a complex number $a(\neq 0, 1)$ we write

$$\overline{N}(r)=\overline{N}(r, 0)+\overline{N}(r, 1)+\overline{N}(r, \infty)+\overline{N}(r, a),$$

$$\overline{N}_j(r)=\overline{N}_j(r, 0)+\overline{N}_j(r, 1)+\overline{N}_j(r, \infty)+\overline{N}_j(r, a) \qquad (j=1, 2).$$

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